

ADVISORY NOTE

A service to A.G. Coombs Group Clients



EC Fans - Why the Hype?

EC fans are a hot topic in energy efficient air movement technology, with options available for almost every application in a HVAC system. These 'new technology' fans use significantly less energy compared to conventional fan designs and in existing commercial buildings their retrofitting could result in reductions of up to 10% in overall building energy consumption. As with all promising new technologies there are a range of factors that should be considered to help ensure that the potential benefits are achieved.

What is an EC Fan and where can they be used?

In simple terms Electronically Commutated (EC) fans consist of a brushless DC motor with on-board electronics used to drive and control a fan rotor; compared to traditional AC induction motor technology. EC fans are powered by 240 or 415 Volt AC electricity supply, which is converted to DC power by the motor's electronics. EC motors can be up to 30% more efficient than Induction motors, largely because the secondary magnetic field comes from permanent magnets rather than copper windings. The external-rotor arrangement for these motors also makes for a very compact fan design, and the use of electronics to convert and control the power supply offers up other power saving opportunities.

EC fans are now used extensively in various applications, both for newly manufactured equipment and for retrofit into existing plant such as computer room AC units, refrigeration condensers and general HVAC systems. An increasingly common application is their use as replacement 'plug fans' as a significantly more efficient Air Handler Unit (AHU) retrofit option over traditional scroll fans.

Benefits of EC fans over traditional fan and motor technology

- Reduced energy consumption.
- Integrated variable speed control capabilities to allow fan performance to accurately match varying air flow requirements without energy wasteful damping.
- EC motors maintain a high efficiency level at part speeds.
- Lower motor noise, particularly under speed control.
- On-board motor-electrical protection, no need for external line devices.
- Remote monitoring enabled via digital and analogue communication ports.
- Compact motors making them readily interchangeable for retrofits.
- Run cooler than AC induction motors, reducing heat put into air flow and leads to longer component life.

Retrofitting EC fans into AHU units

In commercial buildings AHU fans can be responsible for up to 30% of the total building energy consumption. An EC plug fan retrofit has the potential to reduce AHU fan energy in the order of 10-30%, resulting in potential reductions of up to 10% in a building's overall energy consumption. Energy savings of this scale will contribute to a marked improvement in a building's NABERS energy rating.

EC plug fan retrofit option should be considered for end-of-life AHU fan replacement, or as part of a broader building systems energy reduction initiative. Innovative modular design options for these fans may also offer other advantages along with energy cost savings. Replacement of large traditional centrifugal fans in AHU's is often logistically challenging because of access and space constraints leading to additional installation costs and inconvenience. The ability to replace with number of smaller compact plug fans may favourably address these issues.

Simple payback of the new plant through energy cost savings and simpler logistics can be in the order of 3 - 5 years, with additional on-going benefits including; reduced maintenance requirements, lower fan noise and improved plant redundancy with multiple fans operating.

Installation Considerations

- EC motors require a software setup to enable operation under specified parameters, they can be programmed and addressed prior to delivery to site, reducing the work required on site and saving time.
- When retrofitting AHU's with EC plug fans, the pressure inside the supply air plenum may change from negative to positive; the pressure integrity of the AHU must be assessed and consideration given to the swing direction and locking mechanisms of AHU supply air plenum doors.
- If using EC fans for fire mode operation, the ability to override all internal controls must be considered.

EC fans are a viable and attractive solution for many HVAC applications, offering a number of advantages over traditional AC motors, particularly for AHU fan upgrades.

For more information on EC fans please contact:

Jamie Park, Project Engineer
A.G. Coombs Advisory

T: +61 3 9248 2700

E: jpark@agcoombs.com.au

Published November 2017 | © A.G. Coombs Group Pty Ltd

While every effort has been made to ensure the accuracy of information in this publication the A.G. Coombs Group assumes no responsibility for errors or omissions for any consequence of reliance on this publication.

A.G. Coombs Group Pty Ltd | Ph. +61 3 9248 2700 | Fax. +61 3 9248 2751 | www.agcoombs.com.au

